

Endocrine disrupting chemicals in the environment

New information is emerging about the natural and synthetic chemicals people dispose of every day in their sinks and toilets. While scientists nationally and internationally study the effects of endocrine disrupting chemicals, or EDCs, King County is taking several preventive steps to protect public health and the environment. Those steps include installing more-advanced treatment technologies in some new facilities to clean wastewater far beyond federal and state requirements.

Besides taking part in a national study, King County is looking into new ways to test for EDCs at its Environmental Lab. But, this area of study is so new that scientists are still discovering what groups of soaps, cosmetics, drugs and plastics are EDCs. Studies will continue for many years before definitive answers are known and regulations instituted.

Preventing EDCs from entering the sewer system is the easiest and least expensive way to protect people and the environment--so we will work throughout our service area to help people learn more. This fact sheet will give you an overview of what we know and what King County is doing to address the issue of EDCs until more information is available.

Background

Scientists around the world are studying a new area of environmental concern about natural and synthetic chemicals that may disrupt the endocrine systems of some organisms. The endocrine system is a complex network of glands and hormones that regulate various life functions, such as growth, reproduction and the way various body organs work in humans, wildlife and aquatic organisms.

Concerns emerged more than a decade ago in Europe when scientists found fish with altered reproductive systems in rivers with high amounts of wastewater effluent. Earlier, scientists thought low levels of EDCs presented little risk to the environment or humans. Now, studies are beginning to show that even low levels of some of these chemicals may affect endocrine systems.

What are endocrine disrupting chemicals?

Endocrine disrupting chemicals are compounds that interfere with or mimic a body's natural hormones responsible for growth and development. Many potential endocrine disrupters are chemicals common in the environment because people use them in every aspect of their lives. Some EDCs may be in pharmaceutical and over-the-counter drugs, natural hormones, personal care products like soaps and cosmetics, industrial by-products, plastics and pesticides.

How do we know if a chemical is an endocrine disrupter?

For most chemicals, we don't know for sure yet. Federal and state agencies, such as the Environmental Protection Agency, are leading scientific research in the United States as directed in the 1996 updates of the federal Safe Drinking Water Act and Food Protection Act. The European Union is also actively researching this issue. Some studies show that potentially harmful effects may be caused by a subset of chemicals found in the household and industrial products shown in the diagram on the following page.

What is being done?

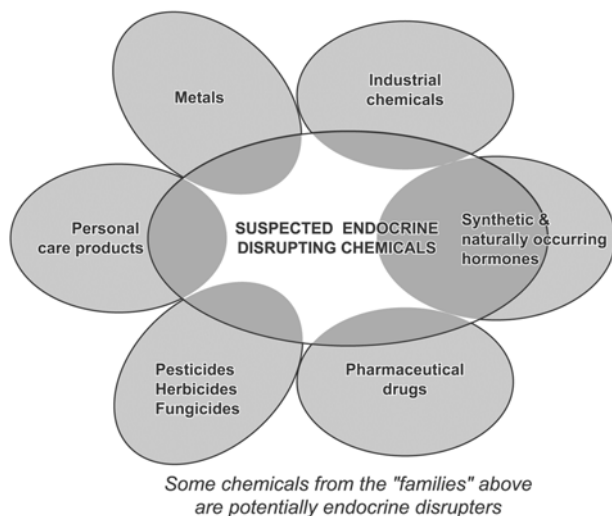
The first step is to identify which of the hundreds of chemicals produced cause endocrine disruption. The second step is to determine the concentrations of exposure that these EDCs affect fish, wildlife and humans. With this knowledge, the next step is to regulate the chemicals identified as being of concern.

How do EDCs get in the water?

Chemicals, such as pesticides, run off lawns into stormwater systems that drain into local waterways. Drugs and products we may use regularly--such as birth control pills, soaps, cosmetics and plastics--enter wastewater from toilets, sinks, showers and dishwashers. A small component comes from wildlife in the natural environment.

Doesn't wastewater treatment remove EDCs?

Federal regulations require that 85 percent of solid materials be removed from wastewater before the treated effluent is discharged into natural bodies of water. Regulations also require that wastewater discharges meet state water quality standards, but these standards do not consider EDC effects at this time. King County's treatment plants use a two-stage process called secondary treatment that typically removes 95 percent of the solids, but this process does not remove all contaminants or EDCs.



New technologies are proving able to remove even more pollutants from wastewater than conventional secondary treatment. For example, the membrane technology to be used at some new King County facilities will produce cleaner effluent by removing more solids and small particles than current technology. Even these advanced technologies are not expected to remove all contaminants or EDCs. The only process that will remove everything is reverse osmosis, and it is very expensive.

How do EDCs affect fish?

Ongoing research by the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and other agencies throughout the world will help us better understand the potential effects of these chemicals on fish and other aquatic organisms. Current research suggests that exposure of fish to some EDCs can mimic estrogen and lead to changes in sex ratios, feminization of male fish, production of vitellogenin (the protein precursor to egg production in female fish) by male fish, and other changes that may affect reproduction or overall health. Other EDCs can mimic androgen (a male hormone) and have different or opposite effects from the estrogen mimicker.

To determine the degree of adverse effect, a relationship must be found between the presence of an exposure to an EDC and the adverse effect. It is difficult to quantify the extent of impacts on individuals or populations. The severity of potential effects related to exposure of these chemicals is not yet known.

What is King County doing?

- We are closely following the research being conducted nationally and internationally. We will respond appropriately to recommendations and amended regulations as more is known about this issue.

- King County's Wastewater Treatment Division has taken part in a nationwide EPA study on this subject.
- King County's Environmental Lab is continuing to investigate new analytical methods for the complex testing of these chemicals.
- In 2003, we collected surface-water samples for analysis of some of these chemicals in the Green River, Lake Washington, Sammamish River and marine waters.
- The Stormwater Services Water Quality Compliance Program makes sure contaminants are not being discharged into surface or groundwater by enforcing King County's stormwater source control requirements.

What can we all do right away?

Controlling chemicals at the source is the easiest and least expensive way to protect the environment and people from the harmful effects of all pollutants including EDCs. King County has several programs for businesses and homes to reduce the amount of contaminants entering the wastewater system:

- Information on less toxic household chemicals can be found at <http://www.govlink.org/hazwaste/house/>.
- Resources about practicing natural yard care can be found at <http://dnr.metrokc.gov/topics/yard-and-garden/>.
- The Local Hazardous Waste Management Program is developing waste drug disposal guidelines. While some prescriptions and over-the-counter drugs may contain EDCs, not all drugs are endocrine disrupters.
- King County's Industrial Waste Program works with large businesses to control the discharge of substances that can degrade water quality or harm workers or facilities. We recently began a program to reduce mercury discharges from dental offices. A pilot project is under way in the Duwamish Waterway to identify and control the source of phthalates (chemicals that make plastic flexible). It is a first-of-its-kind project being conducted with Seattle Public Utilities, the Local Hazardous Waste Management Program and the City of Tacoma. Further information can be found at <http://dnr.metrokc.gov/wlr/indwaste/>.
- The Local Hazardous Waste Management Program works with various businesses and households to reduce the amount of potentially toxic substances being sent down the drain. Further information can be found at <http://www.govlink.org/hazwaste/business/>.
- To find out how to get of stuff you don't want or need, check the Web at <http://dnr.metrokc.gov/WTD/community/oldstuff.htm>. This site tells you what should go down toilets, sinks and other household drains, what should go in the garbage and things that should be disposed of in other safe and healthy ways.

For more information, check the following Web sites:

<http://e.hormone.tulane.edu/>
<http://www.epa.gov/ORD/WebPubs/endocrine/>
http://www.ec.gc.ca/eds/fact/broch_e.htm#title2
<http://water.usgs.gov/pubs/FS/FS-081-98/#HDR01>

See the chart of potential chemicals of concern on Page 4 of this fact sheet.

For more information, please contact Gary Larson, media relations planner for the Wastewater Treatment Division, at 206-263-6157.

For this information in alternative formats, call 206-296-8361 or 711 (TTY)

Endocrine disrupting chemicals that are potentially of concern

Potential endocrine disrupting chemicals	What they do and examples of where they're found
Hormones	
Estrogens, including estrone, estradiol and ethynyl estradiol. Testosterone	Natural and synthetic hormones. Birth control pills containing ethynyl estradiol are one major source of estrogens entering the environment. They're also considered a pharmaceutical.
Industrial chemicals	
Metals	Mercury is found in thermometers, many light switches and some medicines. It's also used in various industrial applications. Cadmium is found in nicad batteries and other industrial uses.
Bisphenol A	This chemical is used to produce epoxy resins and polycarbonate plastics (used commonly in some food and drink packaging).
Phthalates such as diethylhexyphthalate	Phthalates have been widely used as plasticizers in many plastics since the 1930s. They are found in plastic wrap, PVC, vinyl flooring, and ink used to print on plastic containers.
Polychlorinated biphenyls (PCBs) and dioxins (PCDDs)	PCBs were used since 1929 in various electrical applications. While no longer used, they can be found in older electrical installations and in marine sediments. Dioxins are produced during paper manufacturing incineration and to produce chlorinated aromatics.
Personal care products	
Phthalates such as diethylhexyphthalate	Phthalates are used in some cosmetics and in some packaging of personal care products.
Alkyphenols such as nonylphenol and octylphenol	These chemicals are mainly used as surfactants in detergents. They can also be used as plasticizers in plastics and UV stabilizers in plastics.
Parabens	This group of chemicals is used as a preservative in many cosmetics, including hand lotions and shampoos.
Pharmaceuticals and over-the-counter drugs	Only a small subset of pharmaceutical drugs are known or suspected of being endocrine disrupting compounds, mainly synthetic steroids and other synthetic hormones (for example, birth control pills, hormone replacement therapy).
Pesticides	
Pesticides, fungicides and herbicides (DDT, lindane, vinclozolin are just a few)	Several chemicals used to control insect pests or weeds in agriculture, landscaping or home gardening have been identified as possible or definite endocrine disrupters.
Alkyphenols	Alkyphenols are often used as carrier solutions for pesticides.